7.1/9 $y=\cos(2x)$ $y=0$ $x=-\frac{\pi}{4}$ $x=\frac{\pi}{4}$

$\frac{\pi}{2}$ $\frac{\pi}{4}$ $\frac{\pi}{2}$

$A=2\int_0^{\frac{\pi}{4}}\cos(2x)\,dx$

$A=\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}}\cos(2x)\,dx$

$\cos(u)\;du$

$\int\cos(2x)\,dx$

Let $u=2x$

$\frac{du}{dx}=2$

$\frac{du}{2}=\frac{2dx}{2}$

$\frac{du}{2}=dx$

$\int\cos(u)\frac{du}{2}$

$=\frac{1}{2}\int\cos u\,du$

$=\frac{1}{2}\sin u+C$

$=\frac{1}{2}\sin(2x)+C$

$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}}\cos(2x)\,dx=\left[\frac{1}{2}\sin(2x)\right]\Big|_{-\frac{\pi}{4}}^{\frac{\pi}{2}}$

$=\frac{1}{2}\sin\left(\frac{\pi}{2}\right)-\frac{1}{2}\sin\left(-\frac{\pi}{2}\right)$

$=\frac{1}{2}(0)+\frac{1}{2}(1)=\frac{1}{2}$

$$\int_{x=\frac{\pi}{4}}^{x=\frac{\pi}{2}} \cos(2x)\,dx$$

Let $u=2x$

$$\frac{du}{dx}=2$$

$$du=2dx \quad \boxed{\frac{1}{2}du=dx}$$

find the antiderivative in terms of x

use FTC to evaluate def integral

$$\int_{x=\frac{\pi}{4}}^{x=\pi/2}(\cos u)\left(\frac{1}{2}du\right)$$

OR

$$\int_{u=\frac{\pi}{2}}^{u=\pi}(\cos u)\left(\frac{1}{2}du\right)$$

u-substitution with change of limits

if $u=2x$
and $x=\frac{\pi}{4}$
then $u=2\left(\frac{\pi}{4}\right)=\frac{\pi}{2}$

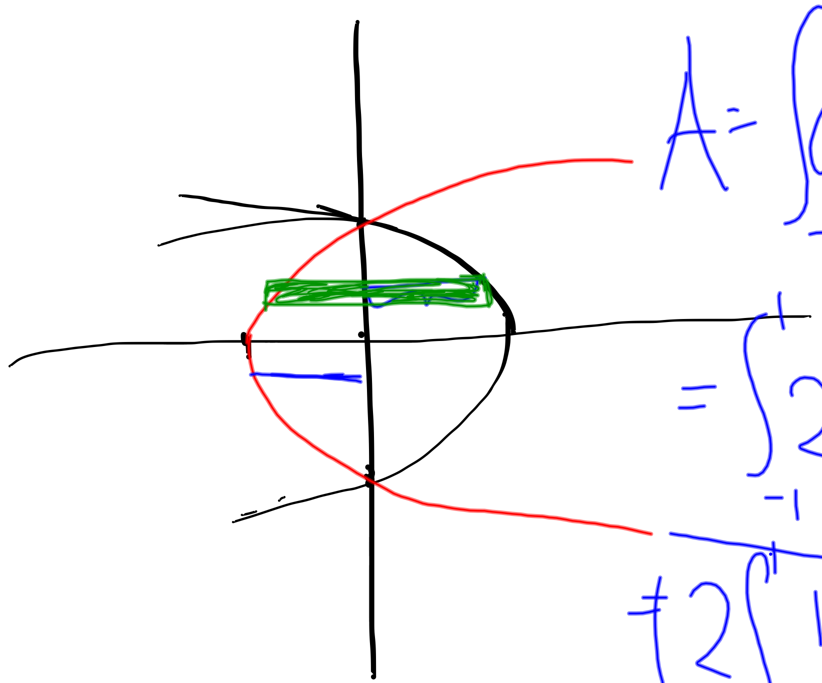
and if $x=\frac{\pi}{2}$
then $u=2\left(\frac{\pi}{2}\right)=\pi$

$$=\frac{1}{2}\int_{\frac{\pi}{2}}^{\pi}\cos u\,du$$

$$=\left[\sin u\right]_{\pi/2}^{\pi}=$$

$$\frac{1}{2}\left(\left[\sin\pi-\sin\frac{\pi}{2}\right]=\left[0-1=-1\right]\right)$$

ws5) $x = 1 - y^2$; $x = y^2 - 1$



$$A = \int_{-1}^{1} \underbrace{(1-y^2)}_{x_1} - \underbrace{(y^2-1)}_{x_2}\, dy$$

$$= \int_{-1}^{1} 2 - 2y^2\, dy$$

$$= 2\int_{-1}^{1} 1 - y^2\, dy$$

Barrons 94) Let $f(x)=3^x-x^3$.

tan $\parallel$ $\frac{f(3)-f(0)}{3-0}=$

solve for x

best answer (E)

slope(secant line) $=\frac{0-1}{3}=-\frac{1}{3}$

slope(tangent line) $=-\frac{1}{3}$

$$f(x)=3^x-x^3$$

$$f'(x)=3^x(\ln 3)-3x^2+\frac{1}{3}=0$$

solve using calculator..... $x=-.557$

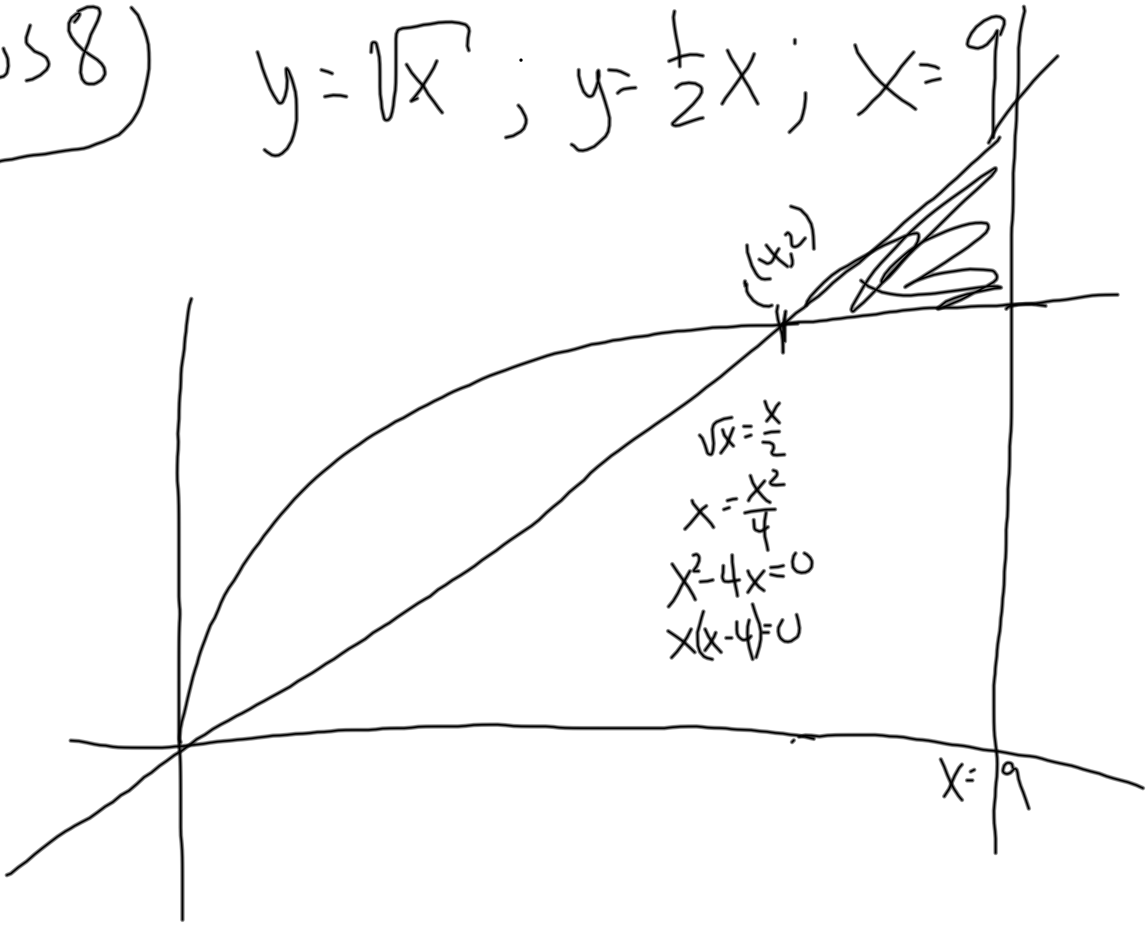
or 1.244

or 2.727

When you find area between curves
are we looking for
"actual" area or net signed area?

FINAL ANSWER: they are the same

ws 8) $y = \sqrt{x}\ ;\ y = \frac{1}{2}x\ ;\ x = 9$



$\sqrt{x} = \frac{x}{2}$

$x = \frac{x^2}{4}$

$x^2 - 4x = 0$

$x(x-4) = 0$

Barrons 74 $y = x^2 - 8x + 10$ for $x \le 4$ is 1-1

Let $g = f^{-1}(x)$. Find $g'(3)$

$$\boxed{g'(x) = \frac{1}{f'(g(x))}}$$

$f(g(x)) = x$

$f'(g(x)) \cdot g'(x) = 1$

so

$$g'(3) = \frac{1}{f'(g(3))}$$

$g(3)$ = the x value that makes $f(x) = 3$

$x^2 - 8x + 10 = 3$

$x^2 - 8x + 7 = 0$

$(x-7)(x-1) = 0$

so $x = 1, 7$

$\therefore x = 1$

$$g'(3) = \frac{1}{f'(1)}$$

$f(x) = x^2 - 8x + 10$

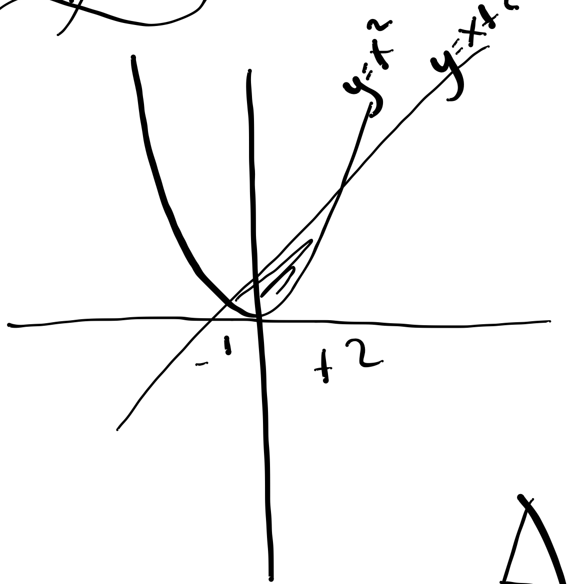
$f'(x) = 2x - 8$

$f'(1) = 2 - 8 = -6$

So $g'(3) = \frac{1}{-6} = -\frac{1}{6}$

7.1/12 $x^2 = y$; $x = y-2$

$\int f(x) - g(x)\,dx$ ($y_1 =$, $y_2 =$)



$x^2 = x+2$

$x^2 - x - 2 = 0$

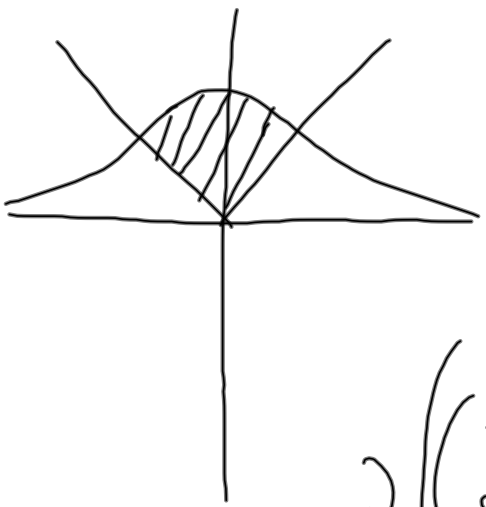
$(x-2)(x+1) = 0$

$$A = \int_{-1}^{2} (x+2) - (x^2)\,dx$$

$$= \left(\frac{x^2}{2} + 2x - \frac{x^3}{3}\right)\Bigg|_{-1}^{2} = \left(2+4-\frac{8}{3}\right) - \left(\frac{1}{2} - 2 + \frac{1}{3}\right)$$

$$= 8 - \frac{1}{2} - 3 = 4\frac{1}{2} = \frac{9}{2}$$

15 $y=\frac{2}{1+x^2}$ $y=|x|$ $x=\frac{2}{1+x^2}$



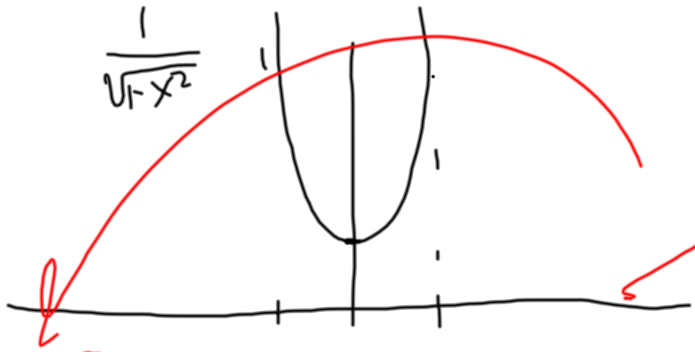
$$2\int_0^1 \frac{2}{1+x^2} - (x)\,dx$$

$$2\left(\left(2\tan^{-1}(x) - \frac{x^2}{2}\Big|_0^1\right)\right)$$

$$2\left(\left(2\tan^{-1}(1) - \frac{1^2}{2}\right) - \left(2\tan^{-1}(0) - \frac{0}{2}\right)\right)$$

$$2\left(\left(2\left(\frac{\pi}{4}\right) - \frac{1}{2}\right) - \cancel{2(0)}\right)$$

$$4\left(\frac{\pi}{4}\right) - 1 = \boxed{\pi - 1}$$



$\int (e^x - 1)\boxed{e^x\,dx}$

$\int e^{2x} - e^x\,dx$

$u = e^x \quad du = e^x\,dx$

$\int e^{2x} - e^x\,dx \qquad \int e^{2x} - e^x\,dx$

$= \int e^{2x}\,dx - e^x + C \qquad u = e^x ; \ \frac{du}{e^x} = dx$

$u = 2x$

$du = 2\,dx$

$\int (e^{2x} - e^x)\frac{du}{e^x} = \int (u^2 - u)\left(\frac{1}{u}\right)du = \int u - 1\,du$

$\int (u-1)\,du$

$\frac{1}{2}\int e^u\,du$

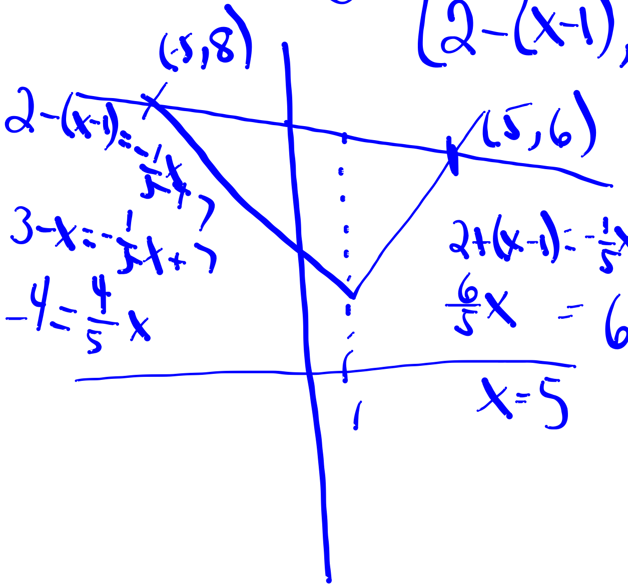
$= \frac{1}{2}e^{(2x)} - e^x + C$

7.1/17/6

$y = 2 + |x-1|$; $y = -\frac{1}{5}x + 7$

$\Downarrow$

$$y = \begin{cases} 2+(x-1), & x \ge 1 \\ 2-(x-1), & x < 1 \end{cases}$$



$2-(x-1) = -\frac{1}{5}x + 7$

$3-x = -\frac{1}{5}x + 7$

$-4 = \frac{4}{5}x$

$2+(x-1) = -\frac{1}{5}x + 7$

$\frac{6}{5}x = 6$

$x = 5$

$$A = \int_{-5}^{1} \left(2-(x-1)\right) - \left(-\frac{1}{5}x + 7\right) dx$$

$+$

$$\int_{1}^{5} \left(2+(x-1)\right) - \left(-\frac{1}{5}x + 7\right)$$

6.8/5 $\int_0^1 (2x+1)^4 dx$ ..... find an antideriv. of

$\int (2x+1)^4 dx$

Let $u=2x+1$

$du=2dx$

$\frac{1}{2}du=dx$

$\frac{1}{2}\int u^4 du = \frac{1}{2}\left(\frac{u^5}{5}\right)+C$

$=\frac{1}{2}\frac{(2x+1)^5}{5}+C$

evaluate defint

$=\left(\frac{1}{2}\frac{(2x+1)^5}{5}\right)\Bigg|_0^1$

$=\frac{1}{10}(3^5)-\frac{1}{10}(1^5)=\frac{242}{10}$

6.8/5b

$$\int_0^1 (2x+1)^4\,dx$$

Let $u = 2x+1$

$\frac{1}{2}du = dx$

$$\frac{1}{2}\int_{x=0}^{x=1} u^4\,du$$

this is WRONG

when $x=0$ and $u=2x+1$ then $u = 2(0)+1$

when $x=1$ $u = 2(1)+1 = 3$

$$\frac{1}{2}\int_{u=1}^{u=3} u^4\,du$$

$$= \frac{1}{2}\left(\frac{u^5}{5}\right)\Bigg|_{u=1}^{u=3}$$

$$= \frac{1}{2}\left(\frac{3^5}{5} - \frac{1^5}{5}\right)$$

Jan 25-12:45 PM